

ON *AMMONITES ROBUSTUS* (R. STRACHEY, MS.), H. F. BLANFORD,
FROM THE HIMALAYAS.

By G. C. CRICK, F.G.S.,
Of the British Museum (Natural History).

Read 9th January, 1903.

IN 1851 Captain (now Sir) Richard Strachey communicated to the Geological Society of London a paper "On the Geology of Part of the Himalaya Mountains and Tibet," based upon the observations which he made during the years 1848-49. The Palæozoic and Secondary fossils therein mentioned were described in 1865, the former by J. W. Salter and the latter by H. F. Blanford, in a joint work of which the title-page reads as follows: "Palæontology of Niti in the Northern Himalaya: being descriptions and figures of the Palæozoic and Secondary Fossils collected by Colonel Richard Strachey, R.E. Descriptions by J. W. Salter, F.G.S., A.L.S., and H. F. Blanford, A.R.S.M., F.G.S. Reprinted with slight corrections for private circulation from Colonel R. Strachey's forthcoming work¹ on the physical geography of the Northern Himalaya. Calcutta: O. T. Cutter, Military Orphan Press. March, MDCCCLXV."

"The [Strachey] collection," says Salter (p. 2), "was brought home numbered and catalogued, but still required months of patient work in breaking up and chiselling out the specimens. When finally arranged upon tablets, with localities, he [Colonel Strachey] placed them all in the colonial collections of the Museum of Practical Geology, and left me the more pleasant task of comparing and describing them." Without doubt, Strachey attached to the fossils the names which Salter and Blanford subsequently adopted in their descriptions. In a footnote on p. 80 Salter states that "all the figured specimens of Colonel Strachey's collection have been liberally presented by that gentleman to the Museum of Practical Geology, London." The Strachey Collection is now, however, in the British Museum, being one of the collections of foreign fossils transferred to this Museum from the Museum of Practical Geology in 1880.

Among the species described and figured by Blanford in the work above mentioned was *Ammonites robustus*, R. Strachey MS. (p. 85, pl. xvi, figs. 1a-c). The two specimens which he figured and

¹ This work was never published.

referred to this species are in the British Museum collection (Nos. C. 5,050 and C. 5,046). Although Triassic fossils, they were described as of Jurassic age, and hence probably escaped the notice of Dr. E. v. Mojsisovics,¹ for they do not appear to be mentioned in his comparatively recent work on the Upper Triassic Cephalopoda of the Himalayas; nor do they seem to have been mentioned by Stoliczka² in his revision of all the known fossils from that district. Blanford characterised the species as a very variable form, but the two figured specimens appear to be specifically distinct, and although both are referable to the same section *Juvarites* of Mojsisovics, one (No. C. 5,050) belongs to the subgenus *Griesbachites* and the other (No. C. 5,046) to the subgenus *Anatomites* of the same author. We have reserved Blanford's name for the original of his figs. 1*a* and *c*, and have given a new name—*Juvarites (Anatomites) expansus*—to the original of his fig. 1*b*. In his description of *Ammonites robustus*, Blanford gave the dimensions of three examples which he designated *a*, *b*, and *c* respectively; *b* and *c* are evidently the two figured specimens just referred to. Now there is in the British Museum (No. C. 6,790), and forming part of the Strachey Collection, another specimen (from Lakhur, Niti Pass) labelled *Ammonites robustus*, the dimensions of which lead us to conclude that this is the example which Blanford designated *a*. It differs, however, so much from the other two examples that we regard it as specifically distinct, and propose for it the name *Juvarites (Griesbachites) Stracheyi*.

Descriptions of the three species are appended.

In 1855 F. v. Hauer³ described under the name *Ammonites robustus* a species from the Trias of Hallstatt, but Strachey's specimens are in no way related to that species.

1. *JUVAVITES (GRIESBACHITES) ROBUSTUS* (Blanford).

1865. *Ammonites robustus* (pars), H. F. Blanford: in J. W. Salter & H. F. Blanford, Palæont. Niti, p. 85, pl. xvi, figs. 1*a*, *c* (not 1*b* = *Juvarites (Anatomites) expansus*).

Shell discoidal, involute, somewhat inflated; greatest thickness at about the middle of the lateral area, nearly one-half of the diameter of the shell; height of outer whorl rather more than one-half of the diameter of the shell. Whorls (? number); inclusion almost complete; umbilicus about one-ninth of the diameter of the shell in width, deep, with steep sides, and subangular margin. Whorl broadly oval in

¹ E. v. Mojsisovics, "Beiträge zur Kenntniss der obertriadischen Cephalopoden-Fauna des Himalaya": Denkschr. k. Akad. Wissensch. Wien, math.-naturw. Cl., Bd. lxiii (1896), pp. 575-701; and Pal. Ind., ser. xv, vol. iii, pt. 1 (1900).

² Geological Sections across the Himalayan Mountains, from Wangtu-bridge on the River Sutlej to Sungdo on the Indus; with an account of the formations in Spiti, accompanied by a revision of all known fossils from that district. Mem. Geol. Surv. India, vol. v (1866), pp. 1-154, 10 pls. See, Table of Cephalopoda, pp. 149-153.

³ F. v. Hauer, "Beiträge zur Kenntniss der Cephalopoden-Fauna der Hallstätter Schichten": Denkschr. k. Akad. Wissensch. Wien, vol. ix (1855), p. 147, pl. ii, figs. 1, 2; pl. iii, figs. 1-3.

transverse section, a little higher than wide, indented to fully one-half of its height by the preceding whorl; periphery broadly rounded, somewhat flattened, fairly well-defined by a row of tubercles on each side; sides gently convex, their central portion being the most prominent; inner area narrow, fairly well-defined, convex, nearly perpendicular to the plane of symmetry of the shell. Body-chamber occupying at least five-sixths of the outer whorl; aperture not seen. Chambers shallow; septal suture¹ as in the accompanying figure.



Septal suture of *Juravites robustus* (Blfd.). The details of the external saddle are not well preserved.

Test with narrow, prominent, rounded ribs, some of which bifurcate near the umbilical margin, the branches again bifurcating at about the centre of the lateral area, and some yet again at the margin of the periphery, the latter point of bifurcation being marked on the greater part of the body-chamber by an elongated node, there being 8 or 9 nodes on the last half of the outer whorl; the ribs do not pass on to the inner area of the whorl, and they are all—except possibly those on the anterior part of the body-chamber—interrupted for a short distance at the centre of the periphery. There are no nodes on the earliest part of the body-chamber.

The present species is represented in the Strachey Collection by a fairly well-preserved example, the original of Blanford's, pl. xvi, figs. 1a, c, which we regard as the type-specimen. The specimen appears to be complete, five-sixths of the outer whorl being occupied by the body-chamber. Blanford (op. cit., p. 85) gave the dimensions of three examples which he designated *a*, *b*, and *c*; this is possibly the example marked *c*, but if so, the thickness of the whorls is much greater than that author gives. The elongated nodes at the margin of the periphery of the last half of the outer whorl are not well shown in Blanford's figure. Its dimensions are:—

| | mm. |
|---------------------------------|------|
| Diameter of shell | 67 |
| Width of umbilicus | 7·5 |
| Height of outer whorl | 34 |
| Thickness of outer whorl | 32·5 |

Type.—B.M. Coll., No. C. 5,050.

Horizon and Locality.—The example of this species is from Niti, and probably from the same horizon as that which has yielded the specimens here referred to *Juravites* (*Griesbachites*) *Stracheyi* and *Juravites* (*Anatomites*) *expansus* respectively, i.e. from the *Daonella*-beds of the Upper Trias.

The present species comes very near *Juravites* (*Griesbachites*) *Stracheyi*, but differs from that species in having its greatest thickness at the

¹ The line of insertion of the septum into the wall of the shell; most frequently termed the suture-line.

middle of the lateral area instead of almost close to the umbilicus, and in having smaller and closer-set nodes at the margin of the periphery. Compared with *J. (G.) Stracheyi*, the difference in the form of the aperture of the shell, or transverse section of the body-chamber, is, judging from the recent *Nautilus*, such as might indicate merely a sexual difference between that species and the present one;¹ but we are led to think that such is not the case, because the difference in the form of the transverse section of the whorl is shown even in the younger whorls, and this difference, we think, would, if merely sexual, not be apparent in the young shell,² and in fact would not be well marked until the animal had arrived at maturity.³

2. JUVAVITES (GRIESEBACHITES) STRACHEYI, sp. nov.

1865. *Ammonites robustus* (pars), H. F. Blanford: in J. W. Salter & H. F. Blanford, *Palæont. Niti*, p. 85.

Shell discoidal, involute, somewhat inflated; greatest thickness almost close to the umbilical margin, about one-half of the diameter of the shell; height of outer whorl about five-ninths of the diameter of the shell. Whorls six or seven; inclusion nearly complete; umbilicus about one-tenth of the diameter of the shell in width, deep, with subangular margin and steep sides. Whorl oval in transverse section, somewhat higher than wide; indented to nearly one-half of its height by the preceding whorl; periphery broadly convex, somewhat flattened, fairly well-defined by a row of tubercles on each side; sides feebly convex, sloping away from the umbilical margin; inner area narrow, convex, almost perpendicular to the plane of symmetry of the shell. Body-chamber occupying at least one-half of the last whorl; aperture not seen. Chambers not seen; septal suture imperfectly known. Test with narrow, prominent, rounded ribs, which usually bifurcate at about the middle of the lateral area, one branch or sometimes both branches again bifurcating near the margin of the periphery, the latter point of bifurcation being sometimes marked by a longitudinally elongated node, there being on the last half of the outer whorl eight of these nodes on each margin of the periphery; nodes probably not confined to the body-chamber;⁴ ribs not passing on to the inner area of the whorl, and all interrupted for a short distance on the median portion of the periphery.

This species is represented by only one example. This is the largest of the examples of *Ammonites robustus*, the dimensions of which are given by Blanford (op. cit., p. 85). The portion of the

¹ See figures by Dr. A. Willey, *Nat. Sci.*, vol. vi (1895), p. 411; also Dr. A. Willey's "Zoological Results," pt. vi (1902), p. 742.

² Dr. Willey states that it is impossible to distinguish the sexes in young shells of the living *Nautilus*. *Nat. Sci.*, vol. vi (June, 1895), p. 412.

³ According to Dr. Willey's observations, propagation takes place in the recent *Nautilus* only after the last septum has been formed. A. Willey's "Zoological Results," pt. vi (1902), p. 746.

⁴ Since the nodes are quite prominent at the commencement of the body-chamber, one is led to think that they existed also on at least a portion of the septate part of the shell.

outer whorl that is preserved formed part of the body-chamber. The specimen is broken transversely across the centre, the fracture revealing the dimensions and form of some of the inner whorls. It shows that up to a diameter of at least 40 mm. the periphery is broadly rounded and continuous with the sides, and that the whorls up to a diameter of more than 52 mm. are wider than high, whilst before reaching a diameter of 80 mm. the whorls are higher than wide. Its dimensions are:—

| | mm. |
|---------------------------------|------|
| Diameter of shell | 80 |
| Width of umbilicus | 8.5 |
| Height of outer whorl | 44 |
| Thickness of outer whorl | 39.5 |

The specimen, being broken transversely across, allows us to give the thickness and height of the whorl at various diameters, thus:—

| | | | | | | | | |
|-----------------------|------|-----|------|-----|----|-----|-----|-----|
| Diameter | 52 | ... | 37 | ... | 26 | ... | 19 | mm. |
| Thickness | 33 | ... | 26 | ... | 19 | ... | 12 | " |
| Height of whorl... .. | 26.5 | ... | 19.5 | ... | 12 | ... | 9.5 | " |

Type.—B.M. Coll., No. C. 6,790.

Horizon and Locality.—The specimen formed part of the Strachey collection from the Himalayas, and when transferred to the British Museum collection from the Museum of Practical Geology, Jermyn Street, was labelled "*Ammonites robustus*, Oolitic, Niti Pass." The specimen bears in ink the name "*Lakhur*," with the figures "28" under it. Mojsisovics records three examples of his *Griesbachites Hanni* from the "dark slaty limestone of the *Daonella* beds of Lauka," and this is probably the horizon and locality which has yielded the present example.

Two species of this genus have been described from the Himalayas, viz., *Ammonites Medleyanus*, Stoliczka,¹ and *Griesbachites Hanni*, Mojsisovics;² the present species differs from the former by its prominent ribbing even on an internal cast, and from the latter by its smaller umbilicus, its more distinctly bifurcated ribs, and fewer nodes at the margin of the periphery.

3. *JUVAVITES* (ANATOMITES) *EXPANSUS*, sp. nov.

1865. *Ammonites robustus* (pars), H. F. Blanford: in J. W. Salter & H. F. Blanford, Palæont. Niti, p. 85, pl. xvi, fig. 1b (not figs. 1a, c = *Juvavites* (*Griesbachites*) *robustus*).

Shell rapidly expanding, inflated; greatest thickness at the umbilical margin, about five-sevenths of the diameter of the shell; height of outer whorl nearly one-half of the diameter of the shell. Whorls few (? number); inclusion almost complete; umbilicus narrow,

¹ F. Stoliczka, "Geological Sections across the Himalayan Mountains," etc.: Mem. Geol. Surv. India, vol. v, p. 54, pl. iv, fig. 5. E. v. Mojsisovics, "Beiträge zur Kenntniss der obertriadischen Cephalopoden-Fauna des Himalaya": Denkschr. k. Akad. Wissensch. Wien, math.-naturw. Cl., Bd. lxxiii (1896), p. 605, pl. x, fig. 2.

² E. v. Mojsisovics: op. cit., Bd. lxxiii (1896), p. 607, pl. x, figs. 3-5.

deep, with steep sides and a subangular margin. Whorl semi-elliptical in transverse section, its width one and a half times its height; indented to about one-third of its height by the preceding whorl; periphery broadly convex, with a narrow median depression, imperfectly defined; sides flattened, feebly convex; inner area well defined, rather broad, nearly perpendicular to the plane of symmetry of the shell. Body-chamber (? length); aperture not seen. Chambers shallow; septal suture imperfectly known. Test with narrow, prominent, rounded ribs, which bifurcate at various places on the lateral area; they are all interrupted at the centre of the peripheral area, the ribs being usually opposite, but sometimes alternating; occasionally there is a groove, somewhat wider than the spaces between the ribs, running from the periphery to the umbilical margin.

The only example of this species in the British Museum collection is one of the specimens figured by Blanford (i.e., pl. xvi, fig. 1*b*) as *Ammonites robustus*. It is probably the example *b*, the dimensions of which are given on p. 85. It is incomplete, being entirely septate; and unfortunately the suture-line cannot be well made out. At the peripheral depression the ribs are usually opposite, but at the anterior portion of the specimen they become alternating. The periphery is not quite so much depressed as represented in Blanford's figure. Its dimensions are :—

| | mm. |
|--|------|
| Diameter of shell (entirely septate) ... | 56·5 |
| Width of umbilicus | 8 |
| Height of outer whorl | 27·5 |
| Thickness of outer whorl... .. | 40 |

Type.—B.M. Coll., No. C. 5,046.

Horizon and Locality.—The single example representing this species is from Niti, and, judging from the matrix, probably from the same horizon as the example which we have referred to *Juravites* (*Griesbachites*) *Stracheyi*, i.e. from the *Daonella*-beds of the Upper Trias.

From the Himalayas Dr. E. von Mojsisovics has described three species referable to the subgenus *Anatomites*, viz., *Juravites* (*Anatomites*) *Bambanagensis*,¹ *J. (A.) Eugenii*,² and *J. (A.) Caroli*,³ all from the 'Karnische Stufe,' and from the *Daonella*-beds. The present species comes nearest to the first-mentioned, but that is smaller and more inflated; still, we believe, both species come very near *Anatomites rotundus*⁴ from the 'Karnische Stufe' of Aussee, Austria. From the two other specimens also referred by Blanford to *Ammonites robustus* the present species is at once distinguished by the absence of marginal tubercles, its more inflated form, and more finely ornamented shell.

¹ Dr. E. v. Mojsisovics, "Beiträge zur Kenntniss der obertriadischen Cephalopoden-Fauna des Himalaya": Denkschr. k. Akad. Wissensch. Wien, math.-naturw. Cl., Bd. lxi (1896), p. 603, pl. xi, fig. 1.

² Dr. E. v. Mojsisovics: op. cit., p. 604, pl. xi, fig. 3.

³ Dr. E. v. Mojsisovics: op. cit., p. 605, pl. xi, fig. 2.

⁴ Dr. E. v. Mojsisovics: Ceph. der Hallstätter Kalke, Bd. ii, p. 98, pl. xc, figs. 6-9; pl. cxxvi, fig. 11; pl. cxcv, fig. 11.